Wilderness & Primitive Area Recreation Participation & Consumption: An Examination of Demographic & Spatial Factors

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Purpose

- **Model individual participation & use for wilderness & other primitive area recreation**

- **Examine influence of socio-demographic & spatial factors on participation & use**

- **Forecast participation and use for NWPS and primitive recreation areas through 2050**

Background

- Use of original 54 Wilderness areas increased 86% from 1965 to 1994 (Cole 1996)

- Wilderness use growing faster than general outdoor recreation (Watson et al. 1989)

- Other estimates show increased use & users who want a Wilderness opportunity (Cordell et al. 1999)

- 15.7 – 34.7m Wilderness trips and 1.4m visitors in 1995 (Cordell & Teasley 1998)

Data 1

- **2000 National Survey on Recreation & the Environment (NSRE)**

  - **RDD telephone survey**

  - **Version 8 (of 18), n=5000+/-**

  - **Post sample weighted by 5 strata according to census**

Data 2

- **US Census 2004**
  - **Interim Projections by Age, Sex, Race, & Hispanic Origin**

- **Woods & Poole Economics, Inc. 2003**
  - **Metropolitan Population Projections**

- **National Visitor Use Monitoring Project (NVUM)**
  - **FS Wilderness Days & FS Wilderness Visitors**

Methods

- **Logistic regression model**

- **Negative binomial model**

- **Simulation with Census projections**

Logistic Regression Model

- **Probability of participation is a function of various explanatory variables:**

    Probability participate= $1/(1+e^{XB})$

    B = Parameter coefficients

    X = explanatory variables

Dependent Variable

- **NSRE -- (During the past 12 months)**
  Did you visit a wilderness or other primitive, roadless area?

  1=Yes

  0=Otherwise

Explanatory Variables

- **Socio-Demographic: Age, gender, race, immigration status, education, urban/rural status, household income**

- **Environmental awareness: Membership in an environmental organization**

- **Distance: Zip code to NPWS**

Distance

- **Studies indicate visitors are generally from the state the Wilderness area is located in & from the closest region in that state (Roggenbuck & Watson 1988)**

- **Negative correlation btw race & visitation could be due to geographic distribution of Black populations (Johnson et al. 2004)**

- **Distance or proximity factor could mitigate some influence of race & ethnicity**

Distance

- **ArcView 8.3**

- **Matched zip codes with U.S. Zip Code Points (ESRI Data & Maps 2000)**

- **Wilderness Areas of the United States (USGS 2004)**

- **Calculated the distance - between each zip code point & the closest Wilderness area**

Weighted & Un-weighted Means

Variable	Weighted	Raw
AGE	42.8	43.7
GENDER	0.474	0.438
BLACK	0.138	0.076
HISPANIC	0.152	0.067
OTHER	0.048	0.038
BORNUSA	0.882	0.945
MEMBER	0.229	0.259
INCOME	6.92	7.09
EDUCATION	0.208	0.320
URBAN	0.793	0.658
MILES	75.7	76.7

Past Studies

- **Typical participant in O.R. white, male, able-bodied, well-educated, & above avg income (Cordell et al. 1999; Johnson et al. 2004)**

- **Avg age of Wilderness visitors increasing (Watson & Cole 1999; Watson et al. 1995)**

- **For general population, likelihood of participating in Wilderness recreation decreases with age (Johnson et al. 2004)**

Past Studies

- **Proportion of female participants increasing (Watson & Cole 1999; Watson et al. 1995)**

- **Women still less likely to visit (Johnson et al. 2004; Johnson et al. 2005)**

- **Blacks, Latinos, & Asian are less likely than whites to say ever visited a Wilderness (Johnson et al. 2004; Johnson et al. 2005)**

Logistic Estimates (N=4400   PPC=69%)

Variable (Weighted)	Parameter	Std Error	Pr>ChiSq	Change in Probability
Intercept	**-1.99**	.291	**.0000**	-.386
AGE	**-.019**	.002	**.0000**	-.003
GENDER	**.634**	.070	**.0000**	.122
BLACK	**-.986**	.122	**.0000**	-.19
HISPANIC	**-.824**	.176	**.0000**	-.159
OTHER	**-.585**	.182	**.0013**	-.113
BORNUSA	**1.31**	.211	**.0000**	.254
MEMBER	**.768**	.078	**.0000**	.148
INCOME	**.088**	.021	**.0000**	.017
EDUCATION	**.101**	.086	**.2363**	.019
URBAN	**-.139**	.085	**.1039**	.026
MILES	**-.002**	.0006	**.0003**	-.0004

Negative Binomial Model

- **Parameterization within NB specification**
  - **Ln Y = XB + e**

- **Dependent variable: Number of days a person visited a wilderness or other primitive area**

- **Same explanatory variables**

Negative Binomial Results (N=4357)

Variable	Parameter Estimate	Std. Error	P-Value
Intercept	**.046**	.280	**.0939**
AGE	**-.009**	.002	**.0000**
GENDER	**.42**	.071	**.0000**
BLACK	**-1.39**	.085	**.0000**
HISPANIC	**-1.40**	.189	**.0000**
OTHER	**.037**	.171	**.8269**
BORNUSA	**1.72**	.151	**.0000**
MEMBER	**.751**	.088	**.0000**
INCOME	**.057**	.018	**.0015**
EDUCATION	**-.359**	.100	**.0003**
URBAN	**-.721**	.079	**.0000**
MILES	**-.003**	.0004	**.0000**

Logistic & Neg Binomial Results

- **Race (black), ethnicity (Hispanic), immigrant status, distance, & urban dwelling → negative effect Wilderness participation & days**

- **Income, age, gender (male), & education → positive effect Wilderness participation & days**

- **Other & education → some ambiguity**

Projection Methods 2005-2050

- Population projections estimate total population & means for age, gender, race (Black), ethnicity (Hispanic), Other, Urban

- Means used in logistic regression model for each year

- Number of participants based on model predictions & total population

Projection Methods 2005-2050

- **Base - 2002 population values**

- **Index based on rhs projections and model parameters**

- **Estimated 3.5 M unique NWPS visitors**

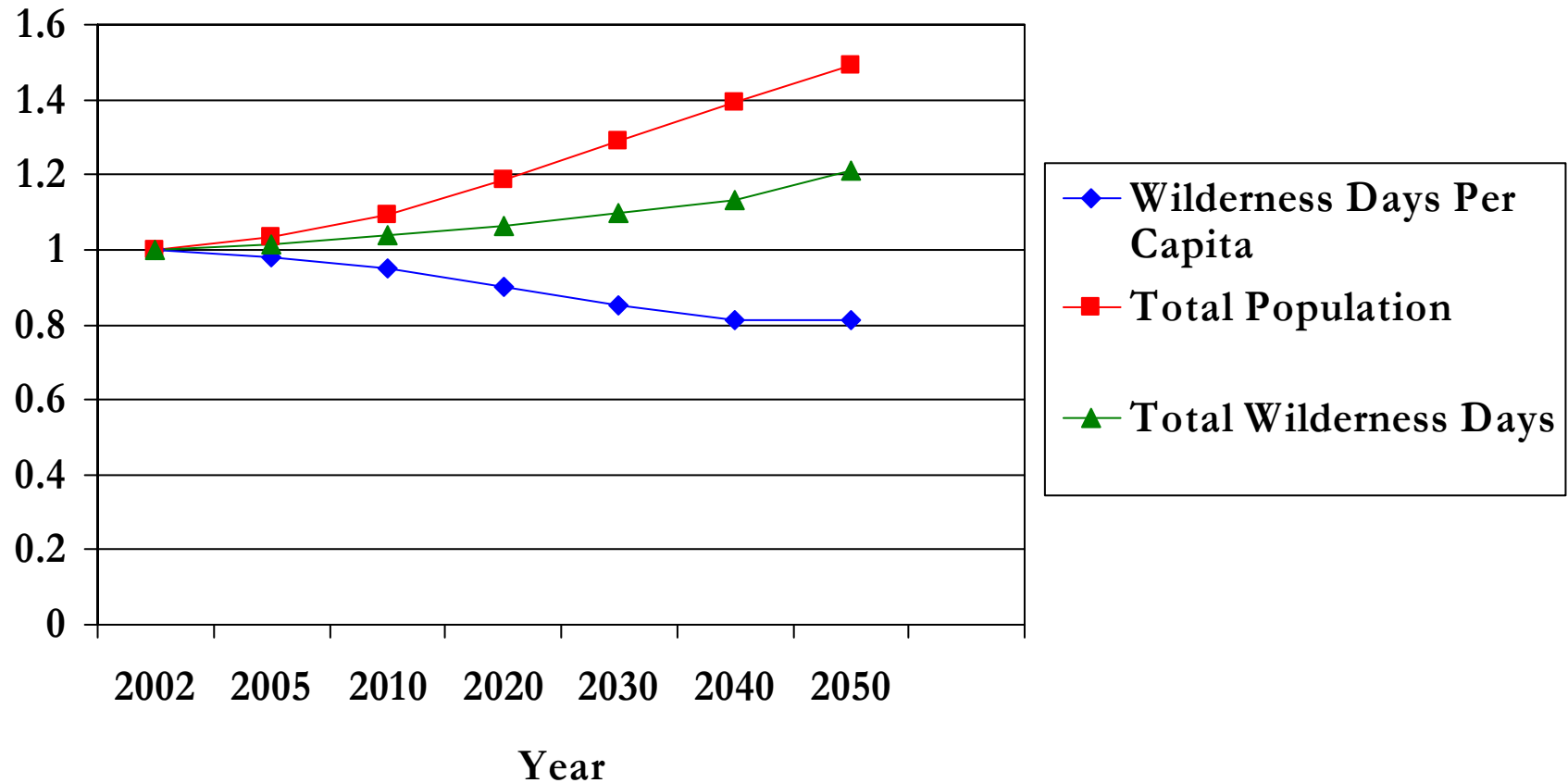- **Estimated 26.6 M days of NWPS use annually (Bowker et al. 2005)**

Participation Index   2002 - 2050
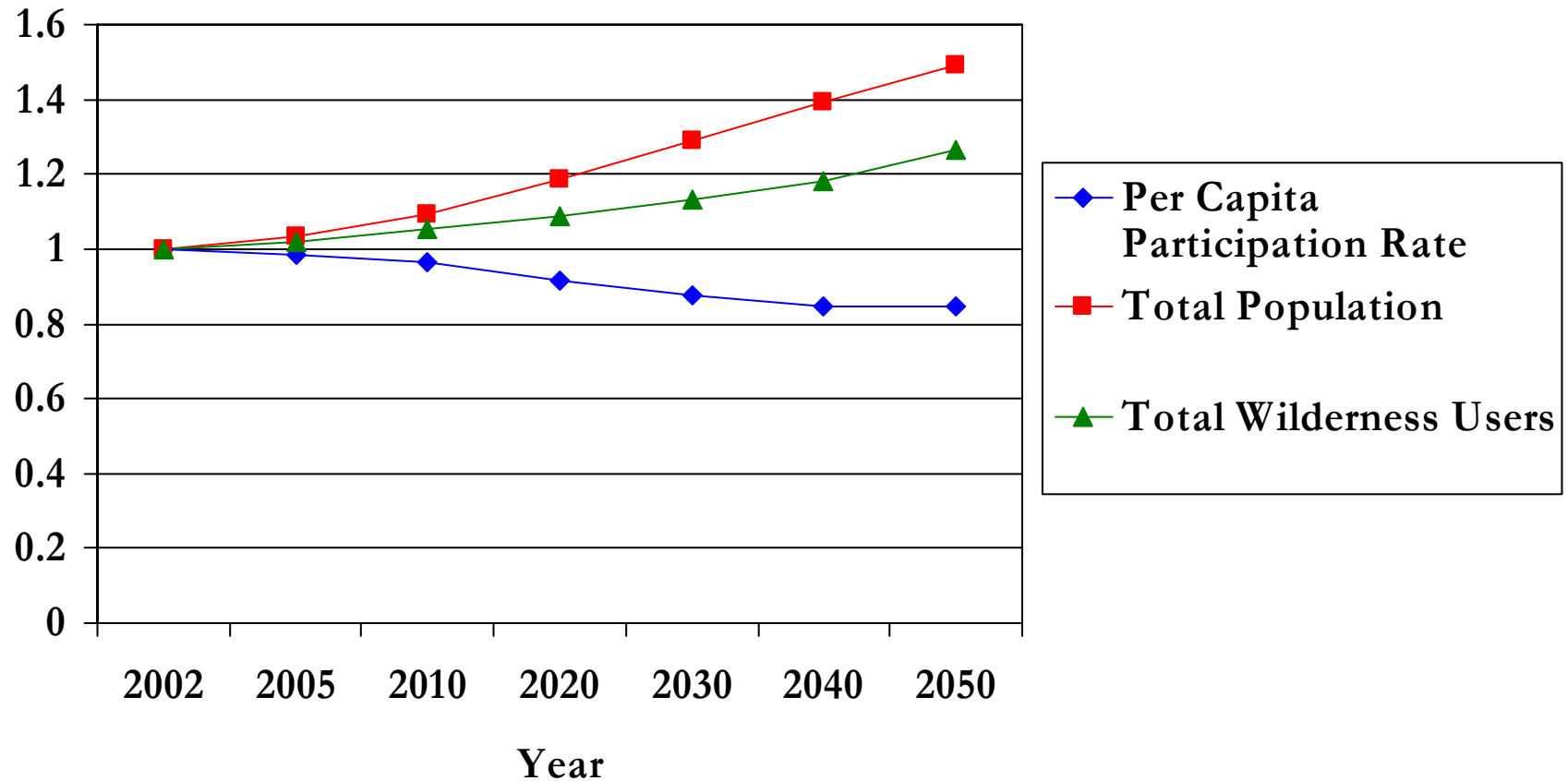
Participants

	2002	**2050**
□ **FS Wilderness**	**2.9m**	**3.66m**
□ **All NWPS**	**3.5m**	**4.46m**
□ **All Wild & Prim**	**56.6m**	**71.4m**

Wilderness Days Index   2002 - 2050

Wilderness Days

	2002	2050
☐ **NF Wilderness**	**21.3m**	**25.8m**
☐ **All NWPS**	**26.6m**	**31.5m**
☐ **All Wild & Prim**	**741m**	**897m**

Bottom Line

- **Population increase 49%**
- **Demographics mitigate pop growth**
  - **NWPS participants increase 26%**
  - **NWPS days increase 20%**
- **Issues/limitations**
  - **Acculturation**
  - **Changing preferences**
  - **Wilderness fringe settlement**
  - **Crowding**